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THE HISTORY OF THE ABORIGINAL NARCOTIC, PITURI

By T. HARVEY JOHNSTON and J. BURTON CLELAND¹

QUITE an extensive literature has grown up in connection with the narcotic, pituri, which plays an important part in the social life of the Australian aboriginal in certain portions of the continent. Inquiries instituted during the course of our various journeys into Central Australia as members of the expeditions² organized by the Board for Anthropological Research, University of Adelaide, have revealed to us the fact that there is much confusion regarding the identity of the plant, or plants, from which the pituri is obtained.

The present paper is an attempt to collect all references to pituri and related narcotics utilized by the aborigines, as well as to the plants *Duboisia* and *Nicotiana* which furnish the materials.

The name of the substance has been spelt variously in literature. We have come across the following : bedgery, pecherie, pedgery, petcherie, picherie, pidgery, pitchere, pitcheri, pitcherie, pitcherry, pitchery, pitchiri, pitchiry, pitchuri, pitchurie, pitjuri, pituri, piturie, and pitury.

We have retained the name pituri in preference to any other spelling, since it is that most usually employed and can now be looked on as an anglicized word after over sixty years usage in literature. Besides, this spelling expresses the sound satisfactorily (as in English pitchurie, pitchery, or pitjuri). Roth (1897, 51), however, stated that it was pronounced pi-tu-ri, in Western Queensland, but he pointed out (1897, 1) that in the district referred to, p and b, as well as d and t, were often interchangeable. As will be mentioned later, it was known to the explorers in the north-east corner of South Australia in 1861 and 1862 as "pedgery," "bedgery" and "pitcheri,"

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these being the earliest references to the name. Hodgkinson, who first recognized the pituri plant actually growing, stated that it was called by the local natives *pitcherie* (1877, 10). Morris (1898, 357) suggested that the name was derived from *betcheri*, another form of *boodjerrie*, meaning good, expressing the excellent qualities of the plant. He gave as variants *budgerie*, *budgeri* and *boodjerre* (p. 61, from Collins' *Vocabulary of the Port Jackson Dialect*, 1798), the word being included in *budgerigar* or *betcherrygar*, the name of the shell parrot or love-bird, taken over from the natives by the whites—*gar* meaning parrot. He also quoted (1898, 311) John Dunmore Lang who, in his book "*Cooksland*" (1847, 447) referred to the natives learning names from the white man who had previously learned them from other native tribes, and thus whites thought these to be aboriginal words of the district, while natives thought them European. As instances, "*corrobbory*" (a term in the Sydney dialect for a general assembly of natives), "*myall*," *etc.*, were given. We have no doubt but that the word *pituri* belongs to this category. Lauterer (1896, 621) pointed out that the names of native weapons adopted by the Australian colonists were derived mostly from the Sydney blacks. Sir Baldwin Spencer (1928, 158) in referring to the substance stated that *pitcheri*, or *pituri*, was presumably its native name in some part of Australia. As we shall see later, Roth (1897) had previously indicated that this name was that applied to the substance by a very small tribe which inhabited a limited area in Western Queensland. No mention was made of the substance in the journals of the Central Australian explorers Sturt, Stuart, Barclay or Gregory.

The first reference in literature to the drug *pituri* seems to be that contained in Wills' diary, dated May 7, 1861: "Various members of the tribe . . . gave us some stuff they called *bedgery* or *pedgery*; it has a highly intoxicating effect when chewed, even in small quantities. It appears to be the dried stems and leaves of some shrub." (Wills, 1861, 28; 1862, 99; 1863, 283).

Howitt (1861), the leader of the rescue party which found King, the sole survivor of the Burke and Wills Expedition, near Innamincka, on Cooper's Creek, where it crosses the boundary of Queensland and South Australia, made the following entry in his

diary, September 10, 1861. The native "gave me a small ball of what seemed to be chewed grass as a token of friendship . . ."; and later in the day some aborigines presented a member of the party "with a small quantity of some dried plant from a bundle which one of them carried; it had a strong pungent taste and smell, and I am at a loss to conjecture its use unless as a kind of tobacco." These two references are certainly to pituri, the former to the narcotic in its prepared and chewed state, and the latter to its condition prior to being used.

In a despatch dated September 2, 1862, from Angipena, Howitt stated that the track which he was then following across Sturt's Stony Desert was one made use of by the natives of Lake Hope, Cooper's Creek and Kyejeron, on their journeys to the north to "procure the pitcheri, so much used by them as a narcotic." (Murray, 1879, 9.)

In 1863 (Johnston, 1863) there was a reference to the presentation to the Royal Society of Tasmania of "nardoo seed and pitcherry, a narcotic plant brought by King, the explorer, from the interior of Australia, where it is used by the natives to produce intoxication . . . Mr. King had presented a sample of the powder to Dr. Mueller, of Melbourne, but the latter thought it was too much broken up for him even to hazard a guess as to the nature of the plant whence it was derived." King had lived for several months with a tribe on Cooper's Creek (after the deaths of the remaining members of the Burke and Wills Expedition) until rescued by Howitt. Dr. Murray (1879), who was a member of Howitt's party, mentioned that King, when his food became so scarce and bad as barely to support life, sometimes obtained a chew of pituri which soon caused him to forget his hunger and the miseries of his position. This evidence shows that the material was utilized by the natives of the Cooper's Creek region adjacent to the present South Australian-Queensland border, but Murray's account referred to its scarcity at the time. King made no mention of the substance in his "Narrative" (1861). Murray gave the pronunciation of the name as pitch-ery, or pitchiri. It was from material brought back from the Burke and Wills Expedition that the plant, *Anthocercis Hopwoodii*, was originally described by von Mueller (1861, 138) in recognition of the financial support given

to the expedition by Mr. Hopwood, of Echuca, though its association with pituri was not established until later, thanks to the efforts of Bancroft, while an examination of specimens brought back from Central Australia by Giles' Expeditions caused Mueller to transfer the species to *Duboisia* (1875, 168 ; 1876, 20).

In 1867 Woolls referred to the occurrence of *Duboisia myoporoides* at Kurrajong and the Shoalhaven and Illawarra areas, the plant possessing an intoxicating property. The aborigines made holes in the trunk and put some fluid in them, the liquid when drawn off and drunk next morning produced stupor. Branches of the shrub were thrown into pools for the purpose of intoxicating the eels and bringing them to the surface (1867, 178). In another of his articles he stated that this "cork-tree" probably possessed deleterious properties, and he had been informed that the natives prepared a stupefying liquid from it (1867, 206).

Joseph Bancroft (1872), the pioneer of Australian pharmacology and parasitology, extracted the alkaloid from material obtained from a locality (Kulloo) eight miles west of Eyre's Creek. He carried out a number of tests on various animals and showed that a very powerful poison was present. He seems to have been the first to publish the name pituri. This paper was re-published in 1876 and 1877. As his material was sent by a police inspector, it may be assumed that it came from the vicinity of Eyre's Creek police station, which is indicated in Winnecke's map (1884), and which apparently developed subsequently into the township of Bedourie, a name very suggestive of Roth's pronunciation of pituri. We have been unable to trace Kulloo, but it probably lay just to the east of Lake Philippi. Bancroft mentioned that the narcotic was used only by the old men of the tribe, which he called the Malutha, but we have been unable to find any other reference to it.

According to a statement made by Ringer and Murrell (1878, 377), Bennett in 1873 referred to the use of pituri as a stimulating narcotic by the natives of New South Wales, but we have been unable to verify the reference. We have not obtained any evidence that the aborigines of that state used the drug in the manner indicated, though the tribes occupying its far north-western corner may perhaps

have done so, since Moore referred subsequently to the presence of *Duboisia Hopwoodii* in that region.

Gosse (1874) in his diary of November 19 and 20, 1873, when he was on the Marryat Creek, just to the east of the Musgrave Ranges, wrote “. . . found plenty of water by digging where the natives had made drinking places for the emu . . . the heat is fearful . . . people travelling would be wise to avoid using water from these drinking places, or any small hole of surface water, as the blacks often put in some preparation to stupify (*sic*) the emu.” This reference is undoubtedly to *Duboisia Hopwoodii* which, as we have ascertained, is known in that locality as emu poison or camel poison. The plants collected by Gosse’s expedition were forwarded to Mueller at the Melbourne Herbarium, but he did not report on them, but some of the material was studied later by Domin (1929).

Mueller (1875, 221), in his list of plants collected by Giles in Central Australia 1872-74, referred to *Anthocercis Hopwoodii* as having been taken near Mt. Liebig, and *Nicotiana suaveolens* at several localities.

Dr. McMillan (1876, 374) exhibited a sample of pituri from the Diamantina, Cooper’s Creek, which was highly prized by the natives who smoked (apparently an error for chewed) it. He mentioned that von Mueller was anxious to receive flowers and fruits of the plant with a view to identifying the species.

Hodgkinson, who was a member of McKinlay’s expedition which searched for Burke and Wills in 1861, subsequently carried out exploration in north-western Queensland. In his report (1877, 12) he stated, “The natives . . . tell mysterious legends of a place called Peecheringa, the natives of which carry on an extensive commerce in a narcotic they call pecherie.” After travelling for some time up the Mulligan River, which he discovered and named, he wrote (p. 17) “Pecherie, Pecheringa, or Eecherimo are indifferently given (by the native guides) as the localities whence the narcotic herb is produced”; and, later, “The pecherie still appears, as it has done for the past week, one sleep distant.” He must have obtained some eventually, because he handed over material to Dr. J. Bancroft (1877) which was subsequently identified for him by von Mueller (1877a) as belonging to *Duboisia Hopwoodii*.

Mueller suggested that *Duboisia myoporoides* might be investigated to ascertain whether its properties were similar (1877, 1878), and in his list of plants collected by Giles in Central Australia in 1875 and 1876, he mentioned *Nicotiana suaveolens* and *D. Hopwoodii* "the pitury plant famed as a powerful stimulant among the natives" as having been found in several localities between Charlotte Waters and Victoria Springs, Western Australia (1877, 305). The remark regarding the narcotic value must have been based on Bancroft's work since Giles made no mention of pituri or *Duboisia* in his accounts of his extensive journeys. Mueller (1875) had recorded previously the presence of both of these species collected by Giles in his earlier expeditions.

Bancroft now turned his attention to *D. myoporoides* (1877, 1877a), prepared an extract and tested its pharmacological properties. Diagnoses of this species and of ? *Anthocercis Hopwoodii* and ? *A. Leichhardtii* were given from Robert Brown's "Flora Australiensis," Vol. 4. He also published a letter from Hodgkinson (1877a) who had supplied him with some pituri. The latter gave the pronunciation as *petcherie* in the locality where he had collected it, and referred to its method of preparation. Hodgkinson also stated that, sixteen years previously, while with the Burke and Wills expedition, and subsequently with McKinlay's search party,³ he had used the substance habitually, when procurable, in default of tobacco, and had often chewed it in its raw and preserved states. Samples of pituri from the Bulloo and from Cooper's Creek were further investigated by Bancroft and tested physiologically. Hodgkinson's material came from the Queensland border, due west of Glenormiston. Figures of this species, as well as of *D. myoporoides*, were published by Bancroft.

Next year Bancroft (1878) added a little more information regarding the plant and the action of its alkaloid. He included a letter from J. Ahern, who forwarded "pitchery" plants obtained on the Mulligan or Eyre's Creek. The latter name has been applied to more than one watercourse in that region. In the same year

³The Journal of Hodgkinson whilst he was with McKinlay's Relief Expedition is in the Archives Department of the South Australian Public Library. It does not contain any reference to pituri.

Holmes (1878) published an abstract of Bancroft's earlier paper (1877).

Smyth, in his Notes on the Aborigines of Victoria, included information relating to those elsewhere, and referred to "pitcherie" as being used by the blacks at Cooper's Creek and derived from a narrow-leaved shrub growing in a region lying to the north-west (1878, 222). Howitt gave the same information in that work (1878, 301, 302, 304), and also stated that a dwarf kind of acacia growing in the sandhills was dried, broken up and chewed along with the "pitchery," which had a slightly pungent taste and resembled some wild kind of tobacco. It was used mainly by the old men, and was obtained from the north-west by the natives, after eight to ten days' journey from the salt lakes at the lower end of the Barcoo, and he inferred that the region where it grew must have been somewhere near or beyond Eyre's Creek. He mentioned that the name was sometimes used for individuals, and gave as examples Pitchery pinnarou (the old-man Pitchery); Pitchery coono mielkee (one-eyed Pitchery). Smyth also reprinted, as a footnote (1878, 222-3), a letter from Mueller to the Editor of the *Australian Medical Journal* (1877), regarding the origin of the narcotic.

Bancroft distributed some of his material from *D. Hopwoodii* and *D. myoporoides* to certain European investigators for further chemical and physiological research, amongst them being Fraser (1879), Ringer and his colleagues (1878, 1879), Petit (1879) and Gerrard (1878), the last-named isolating an alkaloid which he called piturine. Fraser (1879) stated that chemical tests indicated a close resemblance between pituria, apparently a name for the alkaloid, and nicotia, while physiological experiments led him to doubt the identity of the two substances.

Ringer, by himself, as well as in collaboration with Murrell, published several papers relating to the pharmacology of the two species of *Duboisia* (1878, 1879). These investigators, working with an extract made by Gerrard, reported that the pituri alkaloid was remarkably like atropia in its pharmacological effects, and regarded it as a modification of the latter. In one of these papers relating to "pituria," the material was said to have been grown in the Brisbane Botanic Gardens, and to have been extracted by Gerrard. This

indicates that the two species of *Duboisia* had been confused. Bancroft's illustration (1877) is that of a small tree of *D. myoporoides* growing in the Brisbane district. Gerrard extracted alkaloids from pituri, as well as from *D. myoporoides*. Ringer and Murrell reported that pituria showed many characters similar to those of atropia, and stated that pituri was more closely allied to tobacco than to any other solanaceous plant (1879, 134). Ringer and Tweedie (1879) referred to the midriatic properties of *D. myoporoides*, and mentioned Bancroft's work. Curl (1879) gave an account of Bancroft's experiments, and stated that his own work produced confirmatory results.

Mueller and Rummel (1879, 1880) investigated the alkaloids piturine and duboisine, and concluded that the former was in some respects allied to nicotine, but was more closely akin to duboisine, whereas Ladenberg (1880) stated that duboisine was identical with hyoscyamine. Dixon (1883, 198-9) remarked that the name duboisine had been evidently applied to two different substances, judging from the different characters attributed to this alkaloid by various investigators, and suggested that perhaps one was present in the bark and the other in the twigs and leaves. Gerrard's work (1878), like that of Ringer and his colleagues, suggested that duboisine was more nearly related to atropine, but he considered that they were distinct.

In a letter transmitting Bancroft's paper on "Pituri and Tobacco," Gregory (1879) referred to pituri as having properties similar to tobacco, and as being traded far and wide by the natives in Central Australia. In this very important contribution Bancroft included a report on material submitted by him to Petit (1879), who proved that the alkaloid of pituri was nicotine. Bancroft wrote, "In many parts of the interior, from Cooper's Creek to the Gulf of Carpentaria, the pituri grows, and several persons . . . hear it spoken of by the aborigines, but very few know the tree, as the natives avoid giving any information about it." He published an account by S. Brown (1879) of Sandringham, Western Queensland, of the tree and the kind of country in which it occurred. Brown found it growing on high sandy ridges along with spinifex (*Triodia*), between 23° and 24° S., near the Northern Territory border. He stated that the blacks break off the pituri boughs and tie them up in netting

until thoroughly dry, when the leaves are then broken up and enclosed in crescentic netted bags. Figures of these pituri bags were published by Bancroft (1877, 1879). The latter also included a note (1879, 7-8) from Mr. Wiltshire, who stated that the natives of Mt. Hope (South Australia) received their supply of the drug from distant northern aborigines in exchange for red ochre.

Murray, whose account (1879) was re-published by Bancroft, stated that Howitt found it convenient, on account of water requirements, to follow the route taken by natives trading in pituri—Lake Hope, Cooper's Creek and Kyejeron. Murray also said that he felt quite certain that the plant did not grow on Cooper's Creek, otherwise the natives would have possessed it more abundantly. They called tobacco "white-fellow pitchiri." Murray had considered, until Bancroft's results had been made known, that the material had been derived from a *Nicotiana*. He stated that the pure pituri resembled unmanufactured tobacco of a very coarse kind, dried and pulverized, and had a most pungent taste like that of tobacco.

In summing up these various papers, Bancroft stated (1879, 10), "All evidence, practical and theoretical, goes to prove the identity of the two alkaloids, piturine and nicotine; and it is a marvellous circumstance that the black man of Central Australia should have dropped upon the same narcotic principle as the red man of America in a plant differing so remarkably in external aspect."⁴ He suggested that the plant *D. Hopwoodii* should retain its native title, and, therefore, re-named it *Duboisia pituri* (p. 12).

In 1880 Liversidge described the alkaloid from pituri (*D. Hopwoodii*), and gave a summary of the papers of Bancroft (1879), Mueller and Rummel (1879, 1880), Petit (1879) and Ladenburg (1880). His experiments indicated that piturine was distinct from nicotine, though Petit had concluded that the two were identical. He mentioned that Ladenburg had stated that the alkaloid of *D.*

⁴J. P. Harrington (Bur. Amer. Ethnology Bull. 94; *Nature*, Sept. 17, 1932, p. 439), in his paper on Tobacco among the Californian Indians, stated that the material given to Sir Francis Drake by the Indians was *Nicotiana Bigelovii* var. *exaltata*, the species now used by the Karuk people, whereas the Pomo Indians used *N. glauca*, which was introduced from South America, though both species now grew wild in that region.

myoporoides was hyoscyamine—a different result from that reported by Mueller and Rummel.

Liversidge's pituri came from aborigines living on the Barcoo, but was derived by them from the Diamantina natives, who, in turn, obtained it annually by barter from the Kykockodilla or Mulligan tribe, in whose country the pituri grew. The tribe inhabiting the upper Mulligan was stated by Roth (1897) to be the Ulaolinya, but he made no reference to the aborigines of that corner of Queensland adjacent to the Northern Territory-South Australian border. In this region are the lower portions of the Mulligan, Georgina, Eyre Creek and Diamantina. We have not been able to ascertain the names of any tribes who lived in that area, unless the Kykockodilla and Malutha (mentioned by Bancroft in 1872) were two of them.

In 1880 Kempe referred to the presence of native tobacco, *N. suaveolens*, in the moist sand of river beds in the vicinity of Hermannsburg, the plants attaining "an enormous size" (1880, 135). In the light of our later knowledge we may safely assert that he was referring to a different species, probably *N. Gossei*, which the aborigines of the Finke River region call *ingulba* and use as a narcotic.

In 1882 there appeared several papers dealing with the physiological action of the *Duboisia* alkaloid (from *D. myoporoides*) on the eye (Fortescue, 1882, 105; Heyl, 1882, 135; Editor *Austr. Med. Gazette*, 1882, 128). Kempe and Mueller (1882, 22), in referring to the plants of the Hermannsburg region, mentioned that the leaves of *D. Hopwoodii* were used by the natives to poison emus. In 1883 pituri was referred to by Bailey (1883, 350), who stated that the leaves of *D. Hopwoodii* were used by the Central Australian natives to poison emus, and were chewed as a white man did tobacco. In the same year Rusden, in his "History of Australia," mentioned its use in Central Australia by natives who stored it in specially constructed bags (1883, 101; 1897 (1), 47, 97; 1897 (3), 115).

Dixon's extracts (1883) of certain earlier papers have been already mentioned. Next year Bancroft (1884, 104) referred to his attempts to grow seeds of the pituri tree, whose seedlings "damped off in a most vexatious manner." It is of interest to note that Palmer, in his account of the plants used by the natives of the Flinders and Mitchell Rivers either as medicine or as a means for stupefying fish

(1884, 106-8), made no reference to any *Duboisia*, which genus presumably does not occur in that region, though Roth (1897) mentioned that pituri was traded across to the upper waters of the Flinders district.

It was about this time that the far western portion of Queensland, in the neighbourhood of the Herbert and Diamantina Rivers, was being taken up for pastoral purposes, and expeditions were sent out from South Australia to ascertain the nature of the territory in the neighbouring portion of the latter State and the Northern Territory, which it controlled at the time. Winnecke led two such expeditions, the report of the first one—to the Herbert River and the north-east of South Australia—containing no reference suggestive of pituri, though several of his horses were poisoned (1882). His next expedition, in 1883, traversed the district from the Warburton River, in the Lake Eyre region, northwards into territory adjacent to the western border of Queensland, which all earlier reports indicated as the habitat of the pituri plant, and several of the localities referred to by Bancroft and later investigators are marked on his map (1884). Amongst these may be mentioned Sandringham (native name Bindiaca), on Sylvester Creek, near its junction with the Mulligan River, Pitchery Creek with Idumea Station on its banks (this being another name for Glenormiston, according to Roth, 1897), Eyre's Creek Police Station, near Cluny Station, on the Herbert River and just east of Lake Phillipi, Monkarra, on the Diamantina. His map also indicates a succession of extremely long parallel sand ridges extending from the last-named river northward to the Adam Range about 23° S. Though Winnecke did not refer to pituri or to camel poisoning (1884), the plants collected by him, when examined by Mueller (1884, 15 ; 1886, 13) were found to contain both *Nicotiana suaveolens* and *D. Hopwoodii*.

Among the plants obtained in 1885 by Winnecke near Stuart's Range, to the west of Lake Eyre, Mueller mentioned *N. suaveolens* (1886, 160). Two years later he gave a list of plants collected in the vicinity of the Mulligan River, and included *N. suaveolens* and *D. Hopwoodii*, "the famous pituri bush" (1887, 215).

In 1887 Bedford gave an account of his surveying expeditions in the vicinity of Pituri Creek and Glenormiston (p. 107), reproducing

a letter of his from the "Queenslander" of July, 1886, in which the manufacture and method of using pituri were given (pp. 110, 111), the plant growing in a circumscribed area in the vicinity of Mulligan River (near Sandringham), but not on Pituri Creek.

Dr. J. Bancroft's son, Dr. T. L. Bancroft, whose name is also closely associated with pioneering work in Australian pharmacology and parasitology, investigated the properties of native tobacco, *Nicotiana suaveolens*, reporting that its alkaloid was probably identical with nicotine, and that the physiological action of an extract of the dried plant resembled that of tobacco and pituri, *Duboisia Hopwoodii* (1887, 9-10). He went on to remark, "It is interesting to note that the Australian blacks, to whom tobacco and pituri are such a boon, never discovered that this plant possessed the same narcotic action," and though it was growing alongside a native camp on the Gregory River, that they knew nothing of its action, nor had they a name for it.⁵

Bailey and Gordon, in their illustrated account of the plants poisonous to stock in Queensland (1887, 57), referred to *N. suaveolens* and its varieties, *parviflora* and *longiflora*, the latter usually met with inland, and mentioned that the species was generally regarded as being responsible for losses, especially among travelling sheep.

Tate (1889, 97) listed *N. suaveolens* as occurring in the Lake Eyre basin, but did not mention *D. Hopwoodii*. Tate and Mueller (1882, 95) had previously reported the presence of this *Nicotiana* at Peake, a former telegraph station on the Neales, a little to the south of Oodnadatta.

T. L. Bancroft (1889, 928) mentioned the possibility of piturine from *D. Hopwoodii* being identical with nicotine, though investigators had differed in their reports on the matter, and referred to the confusion of these two species in regard to their chemical and physiological properties, their active principles being widely different. Maiden, in his bibliography of the chemistry of Australian plant

⁵Allan Cunningham, in his journal of June 21, 1817, while accompanying Oxley on his journey to the Lachlan, wrote: "*Nicotiana undulata* (= *N. suaveolens*) is very frequent on these flats (near Mt. Flinders, Macquarie Range), the lower leaves of which our people gathered and, when dried, found them not a bad substitute for its congener, *N. tabacum*, although not so strong a narcotic." (Ida Lee's Early Explorers in Australia, 1925, p. 238.)

products, quoted some of the earlier pharmacological work on the *Duboisias* (1889, 190).

In 1890 an important paper was published by Langley and Dickinson on "Pituri and Nicotin," the pituri being obtained from Liversidge. They gave a summary of previous work on the Australian alkaloid and its physiological effects, and as a result of further experimental work, came to the conclusion that pituri was identical with nicotine, thus confirming the results of certain earlier investigators (1890, 268).

The explorer Tietkens (1890, 9, 10, 21) referred to the poisoning of his camels by poison bush at several localities in the western MacDonnells and at Mt. Olga. Amongst the plants collected by him Mueller and Tate (1890, 104; 1891, 30) recorded *N. suaveolens* and *D. Hopwoodii*, the latter plant being stated to be "fatal to camels."

Vogan (1890, 94) referred to the alleged power of "pitchurie" to enable old men to act as seers, and thus obtain power and perquisites. Lumholtz (1890, 49) gave an account and a figure of a pituri pouch, and stated that the leaves of the plant, *D. Hopwoodii*, contained a stimulant possessing properties similar to those of tobacco and opium. The substance was widely distributed by barter. The locality from which the pouch had been derived was said to be about 200 miles west of the Diamantina. His map indicated that his most westerly point was the police barracks on that river (about 142° W., 23° S.), which was in the territory of the Goa tribe, as shown in Roth's map. Glenormiston and Carlo (Mungerebar) lie about 200 miles due west of the barracks, and these localities have been referred to in this paper on several occasions as being in the district from which pituri was obtained.

Schulze, in giving an account of the food and customs of the Finke River natives of Central Australia, referred to the use of *Duboisia Hopwoodii* as a poison to intoxicate emus, parrots and other birds (1891, 232). In the same year, Kempe, in a paper dealing with the language of the aborigines of the MacDonnell Ranges, mentioned that the pituri tree was called Murulunga or Mononga (1891, 47). Finselbach (1891) referred to the use of duboisine in Australia, but his article is not available to us.

Carruthers (1892, 3-4), who surveyed the Musgrave Ranges, mentioned that several of his camels were poisoned by eating a shrub which he called *Myoporum deserti*. This species was quoted by Bailey and Gordon (1887, 61), Bailey (1906, 138; 1912, 375) and Maiden (1901) as poisonous to stock, and was termed by them the Ellangowan poison bush (of Queensland), or the dogwood poison bush in New South Wales. It was also listed by Herbert and others (1921) but their belief, though probably correct in the case of fruiting plants, was not based on any experimental evidence. Black (1929, 520), who calls it "turkey bush," because of the fondness of the bustard or "wild turkey" (*Eupodotis australis*) for it, did not refer to its possession of any poisonous properties. Carruthers almost certainly misidentified the plant from the Musgraves, which was really *D. Hopwoodii*, a shrub which shows considerable resemblance to the *Myoporum*.

In 1893 Purcell referred to the narcotic value of pituri, and stated that the plant grew on sandy ridges in a very limited area, between the Mulligan River and 138° W. and between 23° and 24° S. Lindsay, leader of the Elder Exploring Expedition, referred to the poisoning of some of his camels, but the plant causing it was not recognized (1893, 14, 15, 29). This occurred in the Birksgate Range and in the sandhills further west. He indicated the use of pituri (pitchiri) as a narcotic by the natives of that region, as well as by those of the Great Western Desert at a locality about midway between Barrow Range and Queen Victoria Springs, and about 350 miles north-east of Kalgoorlie (1893, 21, 36). The scientific report of the work of this expedition was not published until later (Helms, 1896).

Maiden, in 1893, included the *Duboisias* among his "Useful Australian Plants," and gave a summary of the pharmacological work of Bancroft and later investigators relating to the two species. He mentioned that *D. myoporoides* was called Onunganabie by the Clarence River natives, and Ngmoo by those of the Illawarra tribe, who used the same name for *Myoporum acuminatum*, which was similar in appearance and was not differentiated by them. *D. Hopwoodii* was referred to as "pituri, the celebrated masticatory of Central Australia."

In 1894 Wells published an account of the customs of the natives of the Diamantina-Herbert region, and mentioned that pituri was obtained from Sandringham (Mulligan River district), and that the leaves of the gidyea bush (*i.e.*, *Acacia homalophylla* or, more probably, *A. Cambagei*) were used to supply the ash for mixing with the chewed material (1894, 518). In the same year Lauterer, when writing on the medicinal plants of Queensland, stated (1894, 98) "the leaves of *Duboisia myoporoides*, in Martindale's 'Pharmacopœia' erroneously termed pituri, are imported as an eye remedy into all civilized countries."

In the same year Magarey (1894, 657) mentioned that at times the natives of arid Australia poisoned some water supplies to stupefy emus to render their capture more easy, a variety of nightshade, locally known in the Paroo as native myrtle, being employed for the purpose, while in Central Australia the native tobacco (pituri) was similarly used. The name "native myrtle" was commonly given in the Adelaide district to species of *Myoporum*, Black (1929, 520) applying it to *M. montanum*. As *D. Hopwoodii* resembles members of that genus, it is safe to assume that Magarey, who lived in Adelaide, was really referring to that *Duboisia*. It is of interest to note that he wrote of pituri as being a native tobacco, similarly used as an emu poison. He must have confused two plants and their uses. The native myrtle can hardly be classed as a variety of nightshade.

Helms (1896, 248-9), the naturalist of the Elder Expedition of 1891-92, was surprised to find that the natives of the Everard and Blyth Ranges utilized a species of tobacco which was identified as *Nicotiana suaveolens*. He referred to its leaves being almost dried over heated sand (taken from beneath a fire), kneaded into little balls between the teeth in order to give cohesion, then rolled into a mass about the size of the thumb, then dried again and reserved for future use (p. 293). This mass, when in use, was held within the lower lip and sucked or rolled by the tongue, but during meals was placed behind the ear. It was called Okiri by the Everard natives, and Pulanda by those of the Blyth Range (pp. 318, 320), and grew luxuriantly about the soakages in these two regions. The account of the plant, over four feet in height, with oval, glabrous leaves over

ten inches long by four inches in width, indicates that he was referring to the species we now know as *N. excelsior*, whereas the small short-leaved form which he collected from the Cavenagh and Barrow Ranges and from the sand dunes of the Great Victoria Desert, was most probably the true *N. suaveolens*. He stated that in these latter Western Australian localities the plant was not utilized by the local natives, nor by the tribes of the Fraser Range and Hampton Plains, nor by the Murchison blacks. In regard to the names given by Helms, Mr. N. B. Tindale, Ethnologist to the South Australian Museum, informed us that the word Okeri meant fresh, *i.e.*, not dry, and was applied to green feed as well as to green leaves ; while puljantu was the Pitjanjara name for the chewing tobacco, the plant which was termed mingul by the natives we met at Ernabella in the Musgrave Ranges.

Helms was also surprised that, though *Duboisia Hopwoodii* was found from the Everard Ranges to the Barrow Ranges and throughout the Great Victoria Desert, he had never seen this " more powerful narcotic of pituri . . . which is prized by some of the Western Queensland tribes," used by any of the natives. In view of this fact he thought that its properties were unknown to them, and that only the prepared material was known outside the district where it was gathered, and that those natives who acquired it by barter were entirely unacquainted with it in its natural state.

Mueller and Tate (1896, 373-4) recorded *N. suaveolens* and *D. Hopwoodii* as having been collected by the Elder Expedition from various localities in the north-west of South Australia between Arkaringa and the Birksgate Range.

In 1894 the Horn Expedition, which included some prominent scientists, traversed the western MacDonnell Ranges. The leader, Winnecke (1896, 14), referred to the presence on sand ridges near Glen Edith and Haast's Bluff, of the " pituri bush, *D. Hopwoodii*, which is fatal to camels." In 1896 Stirling, in his account of the anthropology of that expedition (1896, 52, 61) stated that, in the region traversed, pituri (*Duboisia Hopwoodii*) was used as an emu poison, but was not chewed by the natives there as it was by those living in districts adjoining the Queensland border. The plant was stated to grow especially in the neighbourhood of Lake Amadeus

and Ayers' Rock. In Tate's account of the botany of that expedition (1896, 172) he stated that *N. suaveolens* ranged from Charlotte Waters to the Upper Finke, and that *D. Hopwoodii* occurred at Mt. Liebig in the MacDonnells and on sandhills between the George Gill Range and Ayers' Rock.

Huebbe, leader of the Stock-route Expedition of 1895-96, referred to the camel poison bush or native myrtle, *Myoporum deserti*, as being responsible for the loss of some of his animals in the western Musgraves and in Western Australia (1896, 17, 38, 43). As already indicated, the plant must have been *D. Hopwoodii*.

In the following year was published a very important contribution to Queensland ethnography by Roth (1897). In it he indicated the name by which pituri was known to each of several tribes inhabiting that part of Queensland lying to the west of the Diamantina and Flinders Rivers. The name pituri was that given to the material only by the Ulaolinya tribe. Even closely related tribes in the same district had a quite different word for it (p. 51). The Yaroinga⁶ tribe, whose territory ranged from Lake Nash to Urandangie, called it ne-em-pa; the Undekerebina tribe, just southwards, between the Georgina and the Northern Territory border, and in whose area lies Pituri Creek, termed it undakora. The Kalkadoon, to the east of these two tribes, used the name mo-da; while the Pitta-pitta and Karanya tribes of the Boulia district called it ta-rem-bo-la and ti-rum-bo-la respectively (1897, 51).

Roth mentioned that there were a score or more very small tribes inhabiting the Boulia district, and he spoke of them as the Pitta-pitta and Messmates to indicate their close relationship. He gave the names of several of these (p. 41). One of them was the Ulaolinya, from which the word pituri was presumably derived. This very small tribe had its headquarters at Carlo (Mungerebar), and the Upper Mulligan River. Surrounding the Boulia tribes on the north-west, north and north-east were large tribes, viz., the Undekerebina and Yaroinga (Upper Georgina), Kalkadoon (Leichhardt-Selwyn) and Mitakoodi (Cloncurry), Goa (Upper Diamantina)

⁶The Queensland county named Piturie is on the border of the Northern Territory, adjacent to Lake Nash. Urandangie is located within it. The Yaroinga inhabited the region.

and Miorli (Diamantina). He did not indicate what tribes occupied the region to the south and south-west, nor did he make any reference to the Kykockodilla mentioned by Liversidge as the tribe of the Mulligan, nor to the Malutha from whom Bancroft's original supply of pituri was derived. These names may perhaps relate to some of the small unnamed tribes included by Roth amongst the Boulia Messmates, or perhaps they had already died out by that time. There is also the possibility that they may have belonged to the region south of that investigated by Roth. The latter (1897, 41, 42, 100) gave the names of tribes inhabiting various districts referred to in the present paper : Wonkajera at Idamea or Glenormiston (on Pituri Creek) and Herbert Downs ; Karanya at Cluny ; Oolooooloo at Bedourie ; Ulaolinya on the Upper Mulligan ; Rungo-rungo between Roxburgh and Glenormiston ; Yunnalinka and Walookera between Roxburgh and Urandangie ; Yanda on the Burke and Hamilton Rivers ; as well as several others.

Roth gave figures (figs. 328-331) of message sticks requesting the sending of pituri, and also of the sign language (figs. 102-104) relating to the substance. He published information regarding the plant and the preparation of the product. The shrub flowered in the Upper Mulligan River district (which seemed to be the headquarters in Queensland) about January, and was traded in dilly bags to Boulia as a half-green, half-yellow "tea" with abundance of chips in early March, thence being distributed by well-defined trade routes, the Ulaolinya tribes receiving in exchange spears, boomerangs, blankets, nets, red cloths, handkerchiefs, *etc.* The route taken in the distribution of pituri to the various tribes to the north, north-east and east from the Ulaolinya was referred to by Roth (1897, 100), these pituri trade routes⁷ largely passing up the various rivers or creeks belonging to the Georgina and Diamantina systems, and crossing the Selwyn Range to the Mitakoodi tribe and its messmates in the Cloncurry region. Little of the drug penetrated north-east beyond the upper waters of the Flinders (Woonamurra tribe) and Diamantina (Goa tribe, Winton). After arrival at its destination it was then prepared by being roasted and moistened and then mixed

⁷Gregory, in his recent book tracing the development of roads (1931), referred to the "pituri roads" of Central Australia.

with ashes from certain acacias, such as *Acacia hakeoides*, *A. homalophylla* (gidgee or gidyea—probably *A. Cambagei*), and worked up into rolls or quids about two and a half inches long by five-eighths inch in diameter. These quids were sometimes teased up and mixed with threads of native flax (*Psoralea*, a leguminous plant related to *Indigofera* and *Swainsona*) to increase its intercoherence. Pituri was not used for drugging waterholes in order to capture birds or mammals (p. 100) in the districts investigated. Similar information regarding pituri was given by Roth in a later paper (1901, 31), in which he spelt the tribal name as Yuleolinya.

In 1898 Morris, in his dictionary of Austral-English, published a number of references to literature relating to pituri and its method of preparation (1898, 35-8). In 1899 Spencer and Gillen referred to the use of a decoction of the pituri plant (*D. Hopwoodii*) to stupefy emus in Central Australia (1899, 20). Maiden (1899) referred to *D. myoporoides* and to some of the literature relating to its pharmacology.

In 1901 Bailey gave an account of the Queensland species of *Duboisia* (1901, 1097). In the same year Maiden referred to losses of stock due to eating *N. suaveolens*, which was regarded as very deadly (1901, 26), while the introduced *N. glauca* was not considered poisonous, and was readily eaten by fowls and horses. He stated that Mueller believed that *D. myoporoides* was a stock poison, but he himself had not heard of any instances.

In view of the fact that *Acacia salicina* was the plant used preferably to supply ash for mixing with pituri by the natives of the Warburton River area, north-east of Lake Eyre, the ash was analysed by Higgin (1903), who reported that it contained calcium sulphate in much larger quantity than in any other ash then known—sulphuric anhydride 30.09% and lime 40.70%. The method of preparing pituri (*D. Hopwoodii*) was described, and it was stated that the narcotic was also employed in Central Australia for poisoning emus, even in parts where it was not used for mastication. The acacia should probably be termed *A. ligulata*.

Basedow (1904, 19, 48) referred to pituri as being made from the dried leaves of *D. Hopwoodii*, and chewed or sucked in the form of a roll, but carried behind the ear when not in use. This material

was used in the Mann and Musgrave Ranges only by men, and was known as peturr. He mentioned four tribes or groups of natives inhabiting the Musgrave, Everard, Mann and Tomkinson Ranges—Karkurrera, Alinjerra, Wilrurrera (Wilruddida) and Ullparidja, their language being the Wongapitchi. Mr. Tindale, who has recently visited those districts, informs us that these four terms indicate the eastern, northern, western and southern groups of the Pitjanjara tribe, while Tietkens' Birthday Creek and the eastern Musgraves are in the territory of the Yankunjajara tribe, though the Pitjanjara are now migrating eastwards into that region.

In 1906 Morrison gave a very brief account of a Western Australian *Duboisia* which he named *D. Campbelli*, differing from *D. Hopwoodii* in some minor features, but the only subsequent writer who refers to it as distinct seems to have been Herbert (1921). Morrison stated that pituri, *D. Hopwoodii*, also occurred there, and was utilized for chewing and as a poison for emus and kangaroos (1906, 15).

Bailey (1906) mentioned that *D. myoporoides* was supposed to have caused blindness in cattle which had browsed on its foliage. *D. Hopwoodii* was spoken of as the pituri of the natives. *N. suaveolens* came in for further comment as a very poisonous plant to which stockmen often attributed losses, the specimens submitted being generally the variety *parviflora*, which was the most abundant. The variety *longiflora*, possessing long flowers and decurrent leaves (suggestive of the ingulba which we have seen natives using in the MacDonnell Ranges) was stated to come from the inland downs country, while variety *Debneyi*, the most robust of those found in Queensland, was known only from the far western area near Monkira (1906, 127, 129). This locality is not far from the pituri region of that state, and is marked on Winnecke's map as Monkarra.

Two years later Eylmann, in his book on the aborigines of Central Australia, gave an account of the pituri plant, *D. Hopwoodii*, its use by the natives, and the reaction of the latter to tobacco derived from the white man (1908, 305-308). In the same year Strehlow (1908, 70) mentioned that a species of *Nicotiana* used as a "chewing tobacco" (also a totem plant) in the Hermannsburg region, was

called inkulba by the Aranda (Arunta) and minkulba by the Loritja (Luritcha) tribes.

Read (1910, 109) mentioned that "the dried vegetable pituri is eaten as a stimulant, and forms far the most important, indeed, almost the only, object of commerce between tribe and tribe." This statement requires modification, since some commodity must be offered and accepted in exchange for the narcotic, as has been referred to by Wiltshire, Roth and Spencer.

Rothera (1910), using pituri whose leaf fragments were identified by Ewart as those of *D. Hopwoodii*, confirmed, after physiological experiments, Petit's finding that its alkaloid was identical with nicotine. He also gave a summary of earlier pharmacological work, and referred to a statement by Kobert (Lehrbuch der Intoxikationen, p. 1071) that piturin was considered to be related to, or identical with, nicotine.

Next year Senft (1911) gave an account of *D. Hopwoodii*, as well as the histology of the stem and leaf, based on material collected by Domin. Pammel included "piturie" from *D. Hopwoodii* amongst the liquid volatile alkaloids, along with nicotine, which was similar in its action (1911, 147, 716).

In 1912 Bailey listed the three species of *Duboisia* occurring in Queensland, referring to *D. myoporoides* as "Dr. Bancroft's eye-plant," and to *D. Hopwoodii* as "pitury," whose leaves were chewed by the natives as a white man chews tobacco. He also mentioned *Nicotiana suaveolens* ("poisonous to stock"), with its three varietal forms, *parviflora*, *longiflora* and *Debneyi*; *longiflora* being indicated as "wild tobacco" (1912, 358). In response to our request for further information, Mr. C. T. White, Government Botanist of Queensland, kindly supplied the following notes on *N. suaveolens* and its varieties in that State:

- "1. *N. suaveolens* Lehm. As I understand the type it mostly occurs in Queensland and in the western parts of the State, ranging from somewhere near the New South Wales border to about Jericho, or perhaps a little further north.
2. *N. suaveolens* var. *parviflora* Benth. Some botanists now regard this as a distinct species, keeping it under Robert Brown's name of *N. australis*. If my determination is

correct, this species is common on the edge of very light rain forest from the New South Wales border to about Rockhampton, extending inland for about 150 miles. A little south of Rockhampton, and on the northern Darling Downs, it is very abundant on the edge of mixed forest in which Brigalow (*Acacia harpophylla*) is a common, though not the dominant, tree.

3. *N. suaveolens* var. *longiflora* Benth. This is now recognized by some botanists as a distinct species under the name of *N. megalosiphon* Heurck. This form is widely spread in western Queensland. The nearest locality to the Northern Territory we have represented in our collections is Mount Isa.
4. *N. suaveolens* var. *Debneyi* Bail. The type locality for this variety is Monkira Station on the Diamantina River. We have no other specimens in our herbarium."

He also informed us that his herbarium contained specimens of *D. Hopwoodii* forwarded from two localities only, namely, the Queensland border west of Glenormiston, and from the region between Wompah and Oontoo, but there was no indication whether they had grown there. Monkira is the same place as that called Monkarra in Winnecke's map (1884), and lies about 70 miles E.S.E. of Bedourie. Mt. Isa is about 66 miles W.S.W. of Cloncurry in the territory of the Kalkadoon tribe, near the Pitta-pitta boundary, according to Roth's map (1897). Wompah is near the termination of the Bulloo, close to the boundary of New South Wales, while Oontoo lies just to the east of Innamincka, which is within South Australia, and is the locality where Burke and Wills perished. These two places are about 140 miles apart.

Spencer and Gillen (1912, 106-107), in their chapter on the desert region of Lake Amadeus, have an account of the preparation of "pitcheri," which was obtained from *D. Hopwoodii*. This plant was also used as an emu poison, leaves being pounded up in water and the decoction thus made was either placed in a wooden vessel out in the scrub, where the birds were likely to come, or put into a water pool frequented by the bird, stupefaction being produced.

The ashes of *Acacia* or *Cassia* were mixed with the narcotic before it was chewed, or, rather, sucked. These authors stated that the narrow leaves were packed tightly into woven bags and traded for many hundred of miles to the north into the central parts of Queensland and New South Wales, weapons being received in exchange.

These remarks regarding trade routes are obviously out of place in the chapter relating to Lake Amadeus, as the latter is not far from the Western Australian border, and is between four and five hundred miles to the west of Queensland. There was an old native route immediately to the north of the MacDonnells, but we have no evidence that *Duboisia* was traded to Queensland and New South Wales along it, this material being available very much nearer to those regions.

(To be continued.)

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THE HISTORY OF THE ABORIGINAL NARCOTIC, PITURI

By T. HARVEY JOHNSTON and J. BURTON CLELAND¹

(Continued from previous issue.)

IN 1914 Cleland referred to various poison plants, including *N. suaveolens* and *D. myoporoides*, the information being drawn largely from Maiden and from Bailey and Gordon.

In the same year Basedow published his diary of the Government North-West Expedition of 1903, and in it he referred to pituri as the dried leaves of the "Native tobacco, *Duboisia Hopwoodii*" (1914, 85, 112, 131, 190), the material being made into small rolls which were sucked and, when not used, were carried behind the ear. The narcotic was called Mingul by the Wongapitcha (Ullparidja) tribe from the Western Mann Range and Tomkinson Range, and Peturr by the Karkurrerra natives near Tietken's Birthday Creek. He stated that the plant *D. Hopwoodii* grew in profusion at a rock shelter near that creek. Our recent visit to the adjacent rock holes indicated that Basedow had confused *Duboisia* with *Nicotiana Gossei*, or perhaps *N. excelsior*, as the first, which grows on sandhills, does not resemble tobacco in habit or form, whereas *N. excelsior* was found growing alongside sheltered rock holes in the region near the Birthday Creek, and *N. Gossei* was collected at another rock hole, Erlywanyawanya, about thirty or forty miles away.

In his report on the plants collected by Captain S. A. White during his expedition to Central Australia in 1913, Black (1914, 468) listed *Nicotiana suaveolens*—native tobacco, from Ellery Creek (near Hermannsburg), adding White's note, "plentiful in many of the deep glens and growing on the side of the cliffs along the water-courses; coveted much by the natives." In the light of our later knowledge it is probable that both *N. suaveolens* and *N. Gossei* or *N. excelsior* were present, the reference indicating one of the two latter species, probably *N. Gossei*.

¹Professors of Zoology and Pathology, respectively, in the University of Adelaide.

White, who accompanied Dr. Jack during his geological investigation of the Musgrave and Everard Ranges (1915c, 727), collected native tobacco which differed from *Nicotiana suaveolens* in its habit, and which was much sought after by the natives, the leaves being rolled into a ball and carried between the lips (1915a, 57). He referred subsequently to this species as *N. suaveolens excelsior* (1915b, 717, 720, pl. 63, fig. 2; 1915c, 727), the localities given being the Teeta and Carmeena rock holes in the Everards, Carmen being mentioned as the native name for the plant. The roll of leaves was chewed only by men. Though the widely distributed *N. suaveolens* was found growing in the same region, it was not utilized by the natives (White, in Black, 1915, 835).

Black (1915a, 835) described White's material as a new variety, *excelsior*, and mentioned that the plant had been referred to previously as *N. suaveolens* by Helms (1896) in his report of the Elder Expedition. Black (1915b, 753) stated that the native name of the plant was Kaman, apparently an attempt to indicate the sound more closely than "Carmen," the name reported by White.

Black (1917, 646) listed *N. suaveolens*, but not *D. Hopwoodii*, amongst the plants collected in the region between Mt. Lyndhurst and the north-eastern corner of South Australia. Koch (1898, 114) had previously reported *N. suaveolens* as injurious to stock in the same locality, but he also made no reference to the occurrence of *Duboisia* there.

Petrie, prior to this time, had begun his series of investigations into the chemistry of the Australian flora, and gave special attention to some of the *Solanaceæ*. In 1916 (p. 151) he confirmed T. L. Bancroft's finding of nicotine in the native tobacco, *Nicotiana suaveolens*. Next year he published two papers relating to the *Duboisias*, the first one dealing with *D. Hopwoodii* and *D. myoporoides* (1917, 118), and the second with *D. Leichhardtii* (1917, 137). He gave a history of these species from the pharmacological point of view, and drew attention to the discrepancies in the results of earlier investigations. As a result of careful work he was able to show that pituri contained nicotine, while *D. myoporoides* contained hyoscyamine and norhyoscyamine. He also stated (p. 130) that he had found lævo-scopolamine in addition to the two latter alkaloids in a sample

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of commercial duboisine. Lauterer had reported previously (1895, 457) that *D. myoporoides* contained hyoscyamine in the older tissues, and scopolamine in the young leaves; and that *D. Leichhardtii* contained chiefly the latter. Petrie pointed out (1917, 139) that the tests applied by Lauterer were not sufficiently conclusive, and proceeded to investigate *D. Leichhardtii*, whose habitat in Queensland lies between that of the coastal species *D. myoporoides* and that of the arid *D. Hopwoodii*. He found that it contained a mixture of five midriatic alkaloids, norhyoscyamine, lævo-hyoscyamine, lævo-scopolamine, and small amounts of atropine and noratropine, thus closely resembling *D. myoporoides*, these two species being in marked contrast in this respect to *D. Hopwoodii* (1917, 144-5). His pituri material was dried and fragmentary—apparently “raw pituri,” its locality not being mentioned, while fresh material collected in New South Wales and Queensland was utilized for the chemical examination of the other two species. Rennie, later (1928, 21-2), referred briefly to the chemistry of the *Duboisias*, and more particularly to Petrie’s results.

In 1920 Strehlow gave a brief account of the preparation of a broad-leaved *Nicotiana* (inkulba) for making a chewing mixture in the Hermannsburg region, the method being similar to that already described for *Duboisia*, but a little yellow ochre, “ulba terka” of the Arunta, was mixed with the mass. The pituri (pitjiri), which plays so important a part in the commerce of eastern natives, was stated not to be used by the Arunta and Luritja tribes. In addition to the inkulba, a similar plant (uranba) was also chewed (1920, 6).

In 1921 Herbert gave an account of the poisonous plants of Western Australia. He called *Erythrophloeum Laboucheri*, a tree reaching forty feet in height and occurring in the moister northern regions of the continent, camel bush. Reference was made to *N. suaveolens*, the common north-western variety being indicated as *cordifolia*. The natives in the region behind Port Hedland were said to go out of their way to collect the leaves of the latter, which they smoked as they would tobacco, the effect being to make them at first excited, then stupidly heavy, and finally sleepy. This habit of smoking was stated to have been acquired from the whites. The natives chewed pituri (*D. Hopwoodii*), which was also known in

some places as "narrow leaf," and in the goldfields region as "spinifex poison." He referred to sheep and cattle being poisoned by the plant, and to its utilization by the aborigines for poisoning rock holes to stupefy kangaroos. It was also stated that natives were said to use the smoke of the burning leaves as an anæsthetic for such crude operations as they performed. *D. Campbelli*, which also occurred on the goldfields, probably possessed similar properties to the pituri plant (1921, 36-40). These various statements were repeated in a later bulletin (1926, 57-61).

In 1922 Spencer mentioned, amongst the ethnological exhibits in the Melbourne Museum, "pituri, the leaves of *Duboisia Hopwoodii* chewed and used as a narcotic, and also placed in waterholes to stupefy emus . . ." (1922, 69).

Ewart (1924, 9) mentioned that *N. suaveolens* was spreading rapidly in the lower Finke, and that an apparently unrecorded species was found at the Taylor (Northern Territory). In the "Australian Encyclopædia" (Editor, 1925, 385) there is a short account of pituri, its preparation and use for chewing, as well as for poisoning emus. Reference is also made to *D. myoporoides*.

Cleland, Black and Reese, in their paper on the flora of the north-eastern corner of South Australia (1925, 118), made no reference to *Duboisia*, nor to any species of *Nicotiana* except *N. suaveolens*, which was stated to kill cattle and sheep if eaten on an empty stomach. The region investigated was that extending north from Strzelecki Creek to the Queensland border. In view of the fact that no botanist has recorded *Duboisia* from this region extending eastwards and north from Lakes Eyre and Torrens, it may be assumed that it does not occur there, and this would explain the native trade routes to the north to procure supplies from far-western Queensland.

Basedow (1925), in his work on the Australian aboriginal, made several references to pituri. In exchange for ochre obtainable in the territory of some tribes, other tribes offered such articles as weapons, "pituri leaf," fish or yams (9, 113). In Central Australia pituri leaf was largely used for poisoning water supplies in order to stupefy emus, whereas in north-west Australia the leaves of *Tephrosia purpurea*, containing a saponin, were similarly used (p. 139). All

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tribes from the Wongapitcha eastwards to beyond the borders of Queensland and New South Wales knew the value of the tobacco-like plant (*Duboisia Hopwoodii*), which was obtained by barter from adjoining tribes if not growing in the tribal area. The Dieri, Yantowannta, Wongkanguru and Ngameni (tribes living in the region between Lake Eyre and the north-east corner of South Australia) procured their supply from further north, because the plant did not grow in the Cooper's Creek district, whereas the Arunta and Luritja collected it in the valley of the Finke and other gorges of the MacDonnell Ranges, while the Wongapitcha obtained theirs in the Musgrave and Everard Ranges. The Arunta called it engulba; the Luritja (Aluridja) either mingul or warrakinna; and the Wongapitcha peturr (p. 155). The leaves were partly dried in the sun, or over warm ashes, then made into bundles and taken to camp, where some of the leaves were ground between stones into a powder; then some twigs of acacia (especially *A. salicina*, i.e., really *A. ligulata*) or eucalyptus bark were burnt to an ash, which was mixed with the pituri powder and then worked up with saliva. A quantity of this mixture was taken and rolled within another leaf of the pituri, cigar-fashion, and then was ready for mastication. The social side of pituri chewing was mentioned (p. 156).

Basedow referred to the Dieri tribe using pituri, but Gason, who lived for many years amongst them, and published a short account of their customs and a list of their names for various plants and animals (1879), made no mention of pituri or any substance used similarly. Murray (1879) stated that pituri was apparently unknown to natives south of Cooper's Creek in 1862, when Howitt's expedition passed through, though it was probable that its use had extended more to the southward formerly, but had receded before the advancing tobacco obtained from the white man. The trade route to the pituri country in the north has been referred to already. The region from Eyre Creek north and east to the Queensland border was occupied by many tribes, as is shown in Basedow's map. Helms also referred to them (1896, 276), and gave their approximate boundaries, some of his names being slightly different from Basedow's, e.g., Wonkongnuru, Gnameni, Yandruwuntha. For the last, Howitt (1878, 300) uses the name Yantruwunter.

In 1926 Black considered that the giant tobacco was sufficiently distinct to be raised to specific rank as *N. excelsior* (1926, 286). In his Flora, published the same year, he mentioned *D. Hopwoodii* (pituri or pitcheri) as the only South Australian species of the genus, its range being given thus: the Murray lands to the far north, and westward to Birksgate Range and Ooldea; also western New South Wales and Western Australia (1926, 502). In addition, he referred to *Nicotiana excelsior* from the Everards to the Birksgate Range, and stated that the plant was chewed (as was pituri) by the natives as a narcotic.

Spencer and Gillen in their work on the Arunta (1927, 16, 20) referred briefly to pituri (from *D. Hopwoodii*), called by the natives unkulpa or ungulp, as being used for chewing and for making a decoction for stupefying emus. Though the plant grew in the sandhill country around Lake Amadeus and Ayers' Rock, the greater part of that used by the Arunta and neighbouring tribes, such as the Dieri and Urabunna, appeared to come from the interior of Queensland, distant at least two hundred miles. They remarked that it was curious that though the "true tobacco plant, *Nicotiana suaveolens*," grew plentifully in parts of the Arunta country, the natives had not discovered its narcotic properties.

In 1928 Spencer referred to the subject again, giving a brief description of the plant (*D. Hopwoodii*), and mentioning its methods of use. Pituri bags were traded for hundreds of miles, principally along an old trade route, passing from the north across the interior of Queensland and New South Wales, right to the south of Lake Eyre, shields, boomerangs, spears and other articles being sent in return for them (1928, 158-9).

Domin (1929, 1145-7) described a number of new species of *Nicotiana*: *N. Benthamiana* from north-west Australia; *N. Gossei* and *N. microcalyx* from South Australia; *N. rosulata* from Western Australia; and *N. obtusisepala* from Queensland. He also regarded Bailey's *Debneyi* as being a distinct species, instead of merely a variety of *suaveolens*.

In an account of the flora of Macdonald Downs, about 150 miles north-east of Alice Springs, Cleland (1932, 38) reported the presence of two species of *Nicotiana*, one of them, *N. suaveolens*, known to

the Ilyarra tribe as underilpa, and not utilized by them ; the other, called engwulpa (*i.e.*, engulba), and used as a pituri. This latter species was believed to be *N. excelsior*, but we now know that it was not so, but was either *N. Gossei* or some closely related form.

Cleland and Johnston (1933), in their notes on the ecology of the natives of the Mt. Liebig region in the Western MacDonnells, referred to *N. suaveolens*—engulpi-ingulba of the Luritja tribes, ngulbi-ngulba of the Aranda—as not being utilized, whereas a closely related species or variety growing on the sandhills was used for chewing. This “ sandhills engulba ” is, according to Black, probably a new species. Reference was also made to another kind growing in the gorges—a “ rock pituri ” which was preferred to the other. It appeared to be *N. Gossei*. The leaves, stems and roots of this ingulba (Aranda) or mingulba (Luritja) were dried in the sun, ground up, and then mixed with the ashes from mulga or other *Acacia*, including *A. ligulata*, before being chewed. *Duboisia Hopwoodii* (monunga of the natives) was found on the sandhills, and was not used as a narcotic except for poisoning emus.

Quite recently Seddon and McGrath (1933, 119) reported that *Nicotiana suaveolens* was rapidly toxic to sheep, but that, since the plant was distasteful to them, it was not readily eaten.

Amongst other references to the distribution of *D. Hopwoodii* may be mentioned : Moore (1893, 336)—northern interior of New South Wales ; Ewart and Davies (1917, 244)—Northern Australia, no localities stated ; Cleland (1930, 146)—Bellamy’s Well, near Coondambo and Kingoonya, where animals feeding on it on an empty stomach were said to die in half an hour.

There are several references to introduced species of *Nicotiana* occurring in most of the States, including the north of South Australia, but they have been omitted by us.

It will have been noticed that almost all references to the pituri plant associated with it the name of *Duboisia Hopwoodii*. During our visit to Hermannsburg in 1929, our doubts were raised as to the correctness of such association, as far as concerned the Aranda and Luritja tribes of that part of the MacDonnell Ranges, but we were unable, at the time, to secure specimens of the tobacco-like plant

which, we were informed, provided the narcotic which was chewed by the natives.

We observed pituri being utilized as a narcotic at Macdonald Downs by the Iliaura or Ilyarra tribe, about 180 miles north-east of Alice Springs, in 1930, and at Cockatoo Creek by the Ilpirra, Unmatjera and Wullamala tribes, about 200 miles north-west of the latter locality, in 1931. The material seemed to us to be of the same nature as that observed subsequently at Mt. Liebig, and was probably derived in the three localities from *Nicotiana Gossei*. After our return from Cockatoo Creek we communicated with Mr. H. A. Heinrich, formerly of Hermannsburg, who has had very many years' experience with the natives of the locality. His reply (December, 1931) to our queries contained the following information: "The Arunta natives chewed only the inkulba, *Nicotiana excelsior*. The word pitchiri was not an Arunta word, but was generally used locally by the whites, and some of the natives, when referring to the inkulba. The true 'pitcheri,' *Duboisia Hopwoodii*, called monanga by the Arunta, was not chewed locally, but was traded to the natives south of Charlotte Waters, who used some of it in preparing their pitchiri. The leaves were put in the waters to which emus came to drink, the birds becoming stupefied and then walking in circles, and thus falling an easy prey to the natives. The monanga bush grew fairly plentifully in the sandhills on the Mission property. *Nicotiana suaveolens* was called inkulbinkulba by the Arunta, and was not chewed; it grew more plentifully than the inkulba, which was usually found in sheltered rocky gorges, especially near springs, or in damp ground. The inkulba leaves were gathered, preferably when the first blossoms appeared, then dried in the sun, ground up, and mixed with the ashes of a species of *Acacia*, or of a gum tree, and sometimes wallaby hairs were added to the mixture to make it stick together. Civilized natives liked to add a little sugar to their material."—We believe that the plant referred to by Mr. Heinrich as *N. excelsior* is probably *N. Gossei*.

During our stay at Mt. Liebig, about 200 miles west of Alice Springs, in 1932, we were able to obtain material of *N. Gossei*, *N. suaveolens*, and *D. Hopwoodii*. The first is there called ingulba, engulba, or ngulba by the Aranda, and mingulba by the Luritja

group of tribes, and is found in sheltered rocky situations. It is chewed by all the tribes inhabiting the region westward from Alice Springs to the Western Australian border, including the Aranda, Ngalia, Pintubi, and Yumu peoples. *N. suaveolens*, termed ngulbingulba, or ingulbingulba, is not utilized by them, though its relation to the "rock pituri" is indicated by the similarity of the native names. *D. Hopwoodii*, which occurs on the sandhills, and is called monunga by the Arunta and Luritja tribes, is not chewed in the locality, but is used only as an emu poison in the method already described. *Acacia ligulata*, mulga (*A. aneura*) and other species of the genus, as well as, occasionally, twigs of *Eucalyptus rostrata* (red gum), are used in that locality to provide the ash which serves to liberate the alkaloid in pituri. The hair of wallabies, euros, and kangaroos may be added to increase the tenacity of the bolus. The natives also spoke of engulba to us as bedgereee or bidgereee, just as they used the term tabak, or tabah, for our tobacco. Some of Basedow's remarks (1925) must refer to *N. Gossei* or a related species, as he speaks of a "tobacco-like plant" and of its growth in the gorges of the MacDonnell Ranges. He also mentioned the wrapping of the moist pituri mass in another leaf of the plant, cigar fashion; this could scarcely refer to the leaves of the *Duboisia*, which are relatively small (two to four inches long), and narrow, while those of ingulba are very large and tobacco-like.

During our recent visit to Ernabella (a corruption of the native name Anabala) in the eastern Musgrave Ranges, we noticed both men and women very commonly either chewing the narcotic or holding a roll between the lips, or occasionally behind the ear. Two tribes were represented at the camp; the Yankunjajara,⁸ which occupies the territory from Opparinna south-eastwards to Indulkana, and the Pitjanjara, whose territory included the Mann Ranges and the Western Musgraves, but this tribe is moving eastwards into the region of the former tribe, which now comprises comparatively few members.

⁸Helms (1896, 276), called this tribe the Andijirigna, and gave as its territory the Alberga to Mt. Eba and westward beyond the Musgraves, the Wungarabunna (Arrabonna of Basedow, 1925, and Urabunna of Spencer), being the tribe of the Oodnadatta district and the region to the east of Lake Eyre, including Stuart's Range.

We found that two species of *Nicotiana* were used as a narcotic, viz., the glabrous-leaved *N. excelsior*, and the tobacco-like *N. Gossei*, the former being preferred as being the "stronger." The same names were given to both kinds—piturr, piturrba, mingul, mingulba, minkulba—some of these names being the same as those given by the Luritja group of tribes in the MacDonnells. We believe that piturr is a corruption of pituri, a word introduced, perhaps, by whites long ago, from eastern Central Australia. Some natives called *N. Gossei* mingul, and used the name piturr for *N. excelsior*. The former was said to be the species widely distributed in the Musgraves, whereas the latter had a restricted habitat and did not occur in the western parts of the range. The Pitjanjara of the Mann Ranges called pituri puljantu.

Nicotiana suaveolens also grew in the locality, but was not used by either of the tribes. It was termed mingul-mingulba by the Yankunjara, the doubling of the term indicating that it was a plant resembling milgulba, while the Pitjanjara called it pinna-pinna. White mentioned that *N. excelsior* was called "carmen" in the Everards, but Mr. Tindale ascertained that the natives called Mt. Carmeena, Kárumi (Karr-mi). It is often difficult to catch and indicate the exact sound of native words.

We found *N. excelsior* growing alongside rock holes about twelve miles north of Ernabella, and *N. Gossei* at the Erlywanya-wanya rock hole about thirty-five miles to the south-east. In the vicinity of our camp beside the Ernabella soak, small plants of *N. suaveolens* were common, but the natives made no attempt to use them. Leaves of large plants of the two first-named species collected by us were eagerly asked for by the natives, who chewed fresh flowers and flowering stalks as well as the leaves. Some of the latter were dried on hot rocks, or on the hot ashes, then chewed for a short time to make a bolus, which was then rolled over the ashes of our camp fire, the ashes being those of red gum and mulga. The most favoured plant as an ash producer was *Acacia ligulata*. The hair of the euro or wallaby, or even rabbit fur, was sometimes added to the mass to increase its intercoherence. Sometimes the leaves were dried in the sun, or, if not wanted at once, then when partly dry, were placed in the "roof" of a shelter or wurlie (karnka)

to complete the process. If the leaves had become too dry and brittle they were pounded between two stones into a powder which, after sifting, was stored for future use. Some whites in the Everard Ranges use pituri when the supply of tobacco fails.

Duboisia Hopwoodii, known to whites locally as camel poison, or poison bush, is called walgul, walgulba or walkal, by the Yankunjajara tribe, and tjilla by the Pitjanjara. The natives use it as an emu poison, but otherwise hold it in dread because of its powerful properties. They were much alarmed when one member of our party made pretence to eat some of the leaves. Mr. Tindale, during his travels in the Mann and Musgrave Ranges, observed the species on sandhills, occupying a narrow zone near the crests, and more particularly, on the southward aspect. As localities he mentioned to us the following: the sandhills along the north side of the Mann Range, as well as those between the latter and Mt. Kintore; near Mt. Crombie and Mt. Harriet, as well as in the region between them and extending south-easterly from Mt. Crombie to Pundi; the sandhills midway between Mt. Harriet and Erliwanyawanya. A Yankunjajara interpreter told us that a previous generation of his tribe used walkal when mingul was not available, but our ethnologist, Mr. Tindale, regarded his evidence as being of very little value in this connection.

Mr. Michael Terry informed us that he met with *Duboisia* in the region extending from the Warburton Ranges to Laverton, and that camels, while on the march over the sandhills, had to be prevented from plucking and eating the poisonous leaves and branches.

Mr. J. Lowe told us of the occurrence of a pituri-producing plant, apparently the "sandhills" *Nicotiana*, at Harper's Spring, about 120 miles north of Alice Springs. It was to be found in limestone country where rabbit warrens were present, presumably on account of the richer, moister soil. Its leaves were nearly a foot in length. It was chewed by the natives. Station "boys" liked to smoke it in their pipes if tobacco were not available, or they would mix pituri and tobacco together for smoking.

Mr. F. L. Cavenagh, of Ambalindum, *viâ* Arltunga, in the eastern MacDonnells, informed us that pituri, which was a tobacco-like plant, grew at Harding Springs, and that the leaves were partly

dried and then made into bundles for trading or for further drying. Fresh gum bark was burnt to supply the ash to be mixed with it. Station natives liked to add sugar to their material. Specimens of the leaves about to be used by station "boys" were received recently from Mr. Cavenagh, and appear to be *N. Gossei*.

Mr. C. A. Gardner, Government Botanist of Western Australia, in reply to our queries last year, informed us that *D. Hopwoodii* was utilized there as an emu poison, and that, although statements had been made that it was chewed as a narcotic, he had no definite proof of it. *N. excelsior* was reported by him to be a tall plant common throughout the Murchison area, ranging from near the coast to the eastern borders of the State, whereas *N. suaveolens* was very widely distributed, except in the very wet, south-western part of it. We regard it as probable that the tall form belonged to a species differing from the true *excelsior*.

Mr. J. E. Pick, of Coondambo Station, to the north of Lake Gairdner, informed us recently that the natives of his district and of the Gawler Ranges told him that they never used *Duboisia* as pituri, but that their supply of the narcotic came from the mountains in the far north-west of South Australia, the general term "Musgraves" being used to indicate all those ranges. It is, then, highly probable that *N. excelsior* and *N. Gossei* of those ranges are the source of the pituri used by natives in the vicinity of the east-west railway. Ooldea, no doubt, receives its supply from the same region, as there is a trade route northward from its "soak" to the Everards and Musgraves.

We have traced the use of *Nicotiana* as a chewing narcotic from the Western Australian border both north and south of the latitude of the MacDonnell Ranges, to the eastern limit of these ranges and even beyond this, to a point 150 to 200 miles due east of the particular region, Glenormiston, Sandringham and Carlo, from which pituri was recorded as having been obtained from its special plant identified as *Duboisia*. This gap is largely bridged over by the fact that the Iliaura tribe, which we are informed by Mr. Tindale occupies the greater part of it, uses *Nicotiana*, and not *Duboisia*. Besides, there is a native trade route passing more or less north-easterly from Alice Springs *viâ* Arltunga, Ambalindum, the Plenty, Macdonald Downs

(or Lillaturra, its native name), the Sandover, thence *via* native wells to the Georgina at Lake Nash. Several of the natives whom we met at Macdonald Downs had only recently arrived from Lake Nash, attracted there by the station life, though the region was beyond their own territory. Such a trade route would connect the Aranda, Iliaura and Yaroinga tribes. Roth refers to trade routes along the upper Diamantina, Georgina and the Mulligan. Beyond the eastern ends of the ranges the sandhill country begins, and, as we have seen, extends from the eastern portion of Central Australia (Northern Territory) well into Western Queensland. Associated with this change of country there must be a change of vegetation, species like *engulba*, which require more shelter and moisture, giving place to *Duboisia*, which is a typical sandhill shrub.

Spencer and Gillen (1927) must have been in error in stating that the Aranda received their supplies from the interior of Queensland, and an obvious mistake in their earlier work (1912) has already been referred to. Heinrich has pointed out that it was from this tribe that supplies were forwarded down the Finke, and, presumably, some reached the tribes of Lake Eyre basin in this way. The mass of evidence indicates that these Eyrean peoples obtained the bulk of their pituri from somewhere near the upper Mulligan, and consequently such material would be largely, and perhaps entirely, *Duboisia*.

We are now in a position to summarize the evidence brought forward in this paper. There has been confusion between the two species of *Duboisia* and their alkaloids. *D. myoporoides* seems to have been little used by the natives, except in one locality, where it was employed as a fish poison. *D. Hopwoodii* is very widely distributed in the dry sandy region of Central Australia, and is commonly used as a means for poisoning water supplies in order to catch emus and marsupials. It is, moreover, a serious poison of stock and camels which are prone to feed on it, with fatal result.

The material examined by earlier investigators, and also by Petrie, was pituri as prepared by the natives, or material derived from it, though Bancroft (1879) stated that leaves of *D. Hopwoodii*, actually collected by Hodgkinson on the upper Mulligan and pointed out to him by natives as the pituri bush, were found to have the same

properties as the pituri. These leaves were identified by Mueller. Leaves from Rothera's material were identified by Ewart. Howitt's, as well as Spencer and Gillen's references to stiff narrow leaves indicate *Duboisia*. In spite of the fact that the alkaloid reported as having been found in *D. Hopwoodii* (i.e., nicotine) is different from that found in the other two species of the genus, we must assume, till the contrary is proved by an examination of sufficient undoubted material, that the nicotine came from the *Duboisia*. There is, however, the possibility that pituri may be a mixture of *Nicotiana* with the leaves and twigs of *Duboisia*, and, if so, this may be an explanation of the results obtained. Though the plant usually associated with the drug in the various references to it is mentioned as *Duboisia Hopwoodii*, the narcotic used for chewing in the greater part of Central Australia is not that species, but some kind of tobacco, such as *Nicotiana excelsior*, *N. Gossei*, and at least one, perhaps several, other species. The evidence of whites who have resided in that region, as well as that of the natives themselves, entirely supports the statement. Apart from the remark of one native who had been for most of his life in contact with whites as a "camel boy," Mr. Heinrich's statement that engulba was traded to natives on the lower Finke where it was mixed with *Duboisia*, is the only undoubted indication of the use of the latter plant as a "chewing narcotic" by the natives of any part of Central Australia.

The name pituri was that given to the material by a very small tribe which formerly inhabited the upper Mulligan River in a portion of Western Queensland in the sandhill country adjacent to the Northern Territory boundary. This term, or variations of it, has become widely used in Central Australia, probably through the agency of the white man. Since the term pituri seems to have been the native name for the material in the region whence it was derived and from which it first became known to whites, it follows that such name should be restricted to that particular narcotic in its more or less prepared form. It should not be employed for the Central Australian narcotic material obtained from some species of *Nicotiana*, for which the Aranda name ingulba might be adopted as being the term most widely used by aborigines in that region, the Luritja term mingulba being probably derived from it.

The common native tobacco, *N. suaveolens*, is widely distributed in the drier parts of Australia. There are several varieties, besides distinct, though closely related, species. It is from this latter group that *ingulba* is derived. The aboriginal distinguishes the two groups, using the latter, but not making any use of the former, though it contains nicotine. There must be some substance or substances present in the one group and absent from the other, but this question must be left to chemical research.

Helms was the first to indicate that a *Nicotiana* which he regarded as a form of the widespread *N. suaveolens* was used as a narcotic in Central Australia, while Strehlow pointed out that the Aranda distinguished and utilized two species, *ingulba* and *uranba*, the former being also a totem plant.

Neither pituri nor *ingulba* was smoked by natives before contact with whites had occurred. The term pituri is often applied by them to the white man's tobacco.

There were more or less defined trade routes in Central Australia, these narcotics being very important articles of barter. Such routes were largely determined by the available water supplies and the location of desert areas.

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Several additional references to the chemistry and pharmacology of *Duboisia myoporoides* are quoted by Petrie (1917, 134-5).

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